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EXAMINER

DIAMOND, ALAN D

ART UNIT

PAPER NUMBER

1753

DATE MAILED: 08/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/057,223

Applicant(s)

MCFARLAND, ERICK W.

Examiner

Alan Diamond

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) See Continuation Sheet is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 65-67 and 69-96 is/are allowed.
- 6) ☒ Claim(s) 4, 6, 9-12, 22, 24, 27-30, 32, 38-41, 43-46, 48, 49, 57, 58 and 61-64 is/are rejected.
- 7) ☒ Claim(s) 20, 26 and 60 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☒ Interview Summary (PTO-413) Paper No(s). 8.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other: _____

Continuation of Disposition of Claims: Claims pending in the application are 4,6,9-12,20,22,24,26-30,32,38-41,43-46,48,49,57,58,60-67 and 69-96.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: The instant specification lacks a sentence at page 1, line 1, referring to the provision application (i.e., 60/287,205 filed 04/27/2001) from which the instant application claims benefit. Appropriate correction is required.

Claim Objections

2. Claims 6, 10-12, 20, 22, 24, 26-30, 32, 38-41, 43-46, 48, 49, 57, 58, and 60-64 are objected to because of the following informalities: In claim 6, at line 10, the word "wherein" should be inserted before "the light". At the third-to-last line in each of claims 10-12, 24, 26, 49, 57, and 60 the term "layer" should be changed to "layer;" At the fourth-to-last line in each of claims 20, 27-30, 32, 38-41, 43-46, 48, 58, and 61-64 the term "layer" should be changed to "layer;". In claim 22, at line 7, the term "layer" should be changed to "layer;". At line 1 in each of claims 32, 38-41, 43-46, 48, 49, 57, 58, and 60-64, the word "The" should be changed to "A". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 22 and 62 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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In claim 22, at line 9, the term "predetermined" is indefinite because it is subjective. It is suggested that said term be deleted.

Claim 62 is indefinite because "the charge conducting layer" at line 13 lacks positive antecedent support in claim 62 itself.

Claim Rejections - 35 USC § 102/103

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4, 6, 12, 24, 28, 30, 32, 39, 45, 46, 57, 58, and 62-64 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Skotheim, U.S. Patent 4,442,185.

Skotheim '185 teaches a photoelectric device comprising a layer of n-type semiconductor (131) which reads on the instant light energy conversion layer; a highly

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conductive layer (134) of polymer blend; a p-type semiconductor layer (132) which reads on the instant charge separation layer; and a thin layer of platinum, e.g., of 5-50 angstroms, between the n-type semiconductor layer (131) and the highly conductive layer (134) (see col. 15, line 33 through col. 16, line 18; and Figure 13). It is the Examiner's position that the combination of said thin platinum layer and said highly conductive layer (134) reads on the instant conducting layer (see col. 15, lines 33-50). In particular, said thin layer of platinum of 5-50 angstroms reads on the instant ultra-thin metal film. It is the Examiner's position that said platinum layer and the highly conductive layer (134) inherently provide ballistic transport of charge carriers from the n-type semiconductor layer (131) to the p-type semiconductor layer (132). Indeed, the highly conductive layer (134) produces an improved charge transfer characteristic between the n-type semiconductor (131) and a polymer electrolyte (133) and has a thickness of 100 to 1000 angstroms (see col. 15, lines 33-50). Said platinum layer produces a better electronic and physical coupling (see the paragraph bridging cols. 15 and 16). The contact layer on the right side of p-type semiconductor layer (132) can be a metal (see col. 16, lines 19-29). As an alternative, the p-type semiconductor layer (132) reads on the instant light energy conversion layer, the n-type layer (131) reads on the instant charge separation layer, and the highly conductive layer (134) inherently provides ballistic transport of charge carriers from the p-type semiconductor layer (132) to the n-type semiconductor layer (131). The side of the device facing the incident light can have an antireflective coating (see col. 5, lines 3-6). Semiconductors that can be used include organic semiconductors such as phthalocyanines, i.e., dyes (see col. 5,

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lines 34-46). Note also that Skotheim '185's device can be used with multicolor cells or tandem cells, i.e., a plurality of different photosensitive means (see col. 7, lines 49-55). Since Skotheim '185 teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the presently claimed limitation that the conducting layer provides ballistic transport of charge carriers from the light energy conversion layer to the charge separation layer would obviously have been present once Skotheim '185's photovoltaic device is provided. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

8. Claims 6, 9-12, 24, 27-29, 38-41, 43-46, 48, 49, 57, and 61-63 are rejected under 35 U.S.C. 102(e) as being anticipated by Han, U.S. Patent U.S. 6,150,605.

Han teaches a photovoltaic cell comprising a porous photovoltaic layer (3) that reads on the instant light energy conversion layer; an electrically conductive film (5) that, it is the Examiner's position, reads on the instant conducting layer, and that can be made from, for example, a solid polymer electrolyte; and a second porous photovoltaic layer (7) that reads on the instant charge separation layer; wherein one of the first and second photovoltaic layers is n-type and the other is p-type (see col. 2, line 48 through col. 3, line 31). It is the Examiner's position that said electrically conducting film (5) inherently provides ballistic transport of charge carriers from photovoltaic layer (3) to photovoltaic layer (7). The porous semiconductor layers can be nanometer dimensioned (see col. 3, lines 43-52). Mixtures of semiconductor particles can be used

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(see col. 3, line 20). The semiconductors can be organic or inorganic (see the paragraph bridging cols. 2 and 3). The photovoltaic layers can contain a colorant, such as a cyanine colorant (see col. 4, lines 13-29). Since Han teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the presently claimed limitation that the conducting layer provides ballistic transport of charge carriers from the light energy conversion layer to the charge separation layer would obviously have been present once Han's photovoltaic cell is provided. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

Claim Rejections - 35 USC § 103

9. Claims 4, 6, 9, 12, 24, 27-30, 32, 39, 45, 46, 48, 57, 58, and 61-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skotheim, U.S. Patent 4,442,185, in view of Green et al, U.S. Patent 5,080,725.

Skotheim '185 teaches a photoelectric device comprising a layer of n-type semiconductor (131) which reads on the instant light energy conversion layer; a highly conductive layer (134) of polymer blend; a p-type semiconductor layer (132) which reads on the instant charge separation layer; and a thin layer of platinum, e.g., of 5-50 angstroms, between the n-type semiconductor layer (131) and the highly conductive layer (134) (see col. 15, line 33 through col. 16, line 18; and Figure 13). It is the Examiner's position that the combination of said thin platinum layer and said highly conductive layer (134) reads on the instant conducting layer (see col. 15, lines 33-50).

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In particular, said thin layer of platinum of 5-50 angstroms reads on the instant ultra-thin metal film. It is the Examiner's position that said platinum layer and the highly conductive layer (134) inherently provide ballistic transport of charge carriers from the n-type semiconductor layer (131) to the p-type semiconductor layer (132). Indeed, the highly conductive layer (134) produces an improved charge transfer characteristic between the n-type semiconductor (131) and a polymer electrolyte (133) and has a thickness of 100 to 1000 angstroms (see col. 15, lines 33-50). Said platinum layer produces a better electronic and physical coupling (see the paragraph bridging cols. 15 and 16). The contact layer on the right side of p-type semiconductor layer (132) can be a metal (see col. 16, lines 19-29). As an alternative, the p-type semiconductor layer (132) reads on the instant light energy conversion layer, the n-type layer (131) reads on the instant charge separation layer, and the highly conductive layer (134) inherently provides ballistic transport of charge carriers from the p-type semiconductor layer (132) to the n-type semiconductor layer (131). The side of the device facing the incident light can have an antireflective coating (see col. 5, lines 3-6). Semiconductors that can be used include organic semiconductors such as phthalocyanines, i.e., dyes (see col. 5, lines 34-46). Note also that Skotheim '185's device can be used with multicolor cells or tandem cells, i.e., a plurality of different photosensitive means (see col. 7, lines 49-55). Skotheim '185 teaches the limitations of the instant claims other than the difference which is discussed below.

Skotheim '185 does not specifically teach patterning its n-type and p-type semiconductor layers. However, it is conventional to pattern the light-receiving surfaces

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of semiconductor layers in solar cells so as to facilitate the trapping of light. For example, Green et al teaches patterning of the light-receiving surface of the solar cell so as to facilitate the trapping of the light (see col. 1, lines 5-8; and col. 9, line 29 through col. 10, line 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have patterned the light-receiving surfaces of Skotheim '185's n-type and p-type layers so as to facilitate trapping of the light.

10. Claims 6, 9-12, 24, 27-30, 38-41, 43-46, 48, 49, 57, and 61-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han, U.S. Patent 6,150,605, in view of Lindmayer et al, U.S. Patent 3,949,463.

Han teaches a photovoltaic cell comprising a porous photovoltaic layer (3) that reads on the instant light energy conversion layer; an electrically conductive film (5) that, it is the Examiner's position, reads on the instant conducting layer, and that can be made from, for example, a solid polymer electrolyte; and a second porous photovoltaic layer (7) that reads on the instant charge separation layer; wherein one of the first and second photovoltaic layers is n-type and the other is p-type (see col. 2, line 48 through col. 3, line 31). It is the Examiner's position that said electrically conducting film (5) inherently provides ballistic transport of charge carriers from photovoltaic layer (3) to photovoltaic layer (7). The porous semiconductor layers can be nanometer dimensioned (see col. 3, lines 43-52). Mixtures of semiconductor particles can be used (see col. 3, line 20). The semiconductors can be organic or inorganic (see the paragraph bridging cols. 2 and 3). The photovoltaic layers can contain a colorant, such

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as a cyanine colorant (see col. 4, lines 13-29). Lindmayer teaches the limitations of the instant claims other than the difference which is discussed below.

Han does not specifically teach the use of an antireflection coating. Lindmayer et al teaches that the efficiency of a solar cell is limited due to reflection of useful light striking the top surface of the solar cell (see col. 1, lines 28-31). To reduce this problem of light reflection, an antireflective coating is applied to the surface through which light enters the solar cell (see col. 1, lines 31-33). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied an antireflective coating to the light-receiving surfaces of Han's device so as to reduce the problem of light reflection, as taught by Lindmayer et al.

Response to Arguments

11. Applicant's arguments with respect to the instant have been considered but are moot in view of the new ground(s) of rejection above in the instant Office action.

Allowable Subject Matter

12. Claims 65-67 and 69-96 are allowed.

13. Claim 22 would be allowable if rewritten or amended to overcome the rejection under 35 U.S.C. 112, second paragraph, and the objection for informalities set forth in this Office action.

14. Claims 20, 26, and 60 would be allowable if rewritten or amended to overcome the objection for informalities set forth in this Office action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 703-308-0840. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 703-308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

A handwritten signature in black ink, appearing to read 'Alan Diamond', with a stylized, cursive script.

Alan Diamond
Primary Examiner
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Alan Diamond
August 20, 2003